


**PATENT COOPERATION TREATY**  
**PCT**  
**INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY**  
(Chapter II of the Patent Cooperation Treaty)  
(PCT Article 36 and Rule 70)

Applicant's or agent's file reference PS220769-142	FOR FURTHER ACTION	See Form PCT/IPEA/416
International application No. PCT/AU2004/000111	International filing date (day/month/year) 30 January 2004	Priority date (day/month/year) 31 January 2003
International Patent Classification (IPC) or national classification and IPC Int. Cl. <sup>7</sup> C07D 487/22, C08G 61/12, H01L 31/18		
Applicant UNIVERSITY OF WOLLONGONG OFFICE OF RESEARCH et al		

<p>1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 4 sheets, including this cover sheet.</p> <p>3. This report is also accompanied by ANNEXES, comprising:</p> <p style="margin-left: 20px;">a. <input checked="" type="checkbox"/> (sent to the applicant and to the International Bureau) a total of 9 sheets, as follows:</p> <p style="margin-left: 40px;"><input checked="" type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).</p> <p style="margin-left: 40px;"><input type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.</p> <p style="margin-left: 20px;">b. <input type="checkbox"/> (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or table related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).</p>																									
<p>4. This report contains indications relating to the following items:</p> <table style="width: 100%; border: none;"><tr><td style="width: 10%;"><input checked="" type="checkbox"/></td><td style="width: 20%;">Box No. I</td><td>Basis of the report</td></tr><tr><td><input type="checkbox"/></td><td>Box No. II</td><td>Priority</td></tr><tr><td><input type="checkbox"/></td><td>Box No. III</td><td>Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</td></tr><tr><td><input type="checkbox"/></td><td>Box No. IV</td><td>Lack of unity of invention</td></tr><tr><td><input checked="" type="checkbox"/></td><td>Box No. V</td><td>Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</td></tr><tr><td><input type="checkbox"/></td><td>Box No. VI</td><td>Certain documents cited</td></tr><tr><td><input type="checkbox"/></td><td>Box No. VII</td><td>Certain defects in the international application</td></tr><tr><td><input type="checkbox"/></td><td>Box No. VIII</td><td>Certain observations on the international application</td></tr></table>		<input checked="" type="checkbox"/>	Box No. I	Basis of the report	<input type="checkbox"/>	Box No. II	Priority	<input type="checkbox"/>	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability	<input type="checkbox"/>	Box No. IV	Lack of unity of invention	<input checked="" type="checkbox"/>	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement	<input type="checkbox"/>	Box No. VI	Certain documents cited	<input type="checkbox"/>	Box No. VII	Certain defects in the international application	<input type="checkbox"/>	Box No. VIII	Certain observations on the international application
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<input type="checkbox"/>	Box No. VIII	Certain observations on the international application																							

Date of submission of the demand 24 August 2004	Date of completion of the report 24 March 2005
Name and mailing address of the IPEA/AU AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA E-mail address: pct@ipaustalia.gov.au Facsimile No. (02) 6285 3929	Authorized Officer  S.R. IDRUS Telephone No. (02) 6283 2659

Form PCT/IPEA/409 (Cover sheet) (January 2004)

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## INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

PCT/AU2004/000111

## Box No. I Basis of the report

1. With regard to the language, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.
- ☐ This report is based on translations from the original language into the following language which is the language of a translation furnished for the purposes of:
- ☐ international search (under Rules 12.3 and 23.1 (b))
  - ☐ publication of the international application (under Rule 12.4)
  - ☐ international preliminary examination (under Rules 55.2 and/or 55.3)
2. With regard to the elements of the international application, this report is based on (*replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report*):
- ☐ the international application as originally filed/furnished
- ☒ the description:
- pages 2, 6-31 as originally filed/furnished  
pages\* 1 received by this Authority on 30 November 2004 with the letter of 30 November 2004  
pages\* 3-5 received by this Authority on 15 March 2005 with the letter of 15 March 2005
- ☒ the claims:
- pages 37-39 as originally filed/furnished  
pages\* as amended (together with any statement) under Article 19  
pages\* 32-36 received by this Authority on 15 March 2005 with the letter of 15 March 2005  
pages\* received by this Authority on with the letter of
- ☒ the drawings:
- pages 1/8 to 8/8 as originally filed/furnished  
pages\* received by this Authority on with the letter of  
pages\* received by this Authority on with the letter of
- ☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing.
3. ☐ The amendments have resulted in the cancellation of:
- ☐ the description, pages
  - ☐ the claims, Nos.
  - ☐ the drawings, sheets/figs
  - ☐ the sequence listing (*specify*):
  - ☐ any table(s) related to the sequence listing (*specify*):
4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
- ☐ the description, pages
  - ☐ the claims, Nos.
  - ☐ the drawings, sheets/figs
  - ☐ the sequence listing (*specify*):
  - ☐ any table(s) related to the sequence listing (*specify*):

\* If item 4 applies, some or all of those sheets may be marked "superseded."

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## INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.  
PCT/AU2004/000111**Box No. V** Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability;  
citations and explanations supporting such statement

## 1. Statement

Novelty (N)	Claims 1-54	YES
	Claims	NO
Inventive step (IS)	Claims 1-54	YES
	Claims	NO
Industrial applicability (IA)	Claims 1-54	YES
	Claims	NO

## 2. Citations and explanations (Rule 70.7)

The International Search Report identified the following citations:

D1 Derwent Abstract Accession No. 2001-234912/24  
D2 Derwent Abstract Accession No. 93-137471/17  
D3 Derwent Abstract Accession No. 93-137483/17  
D4 Derwent Abstract Accession No. 93-169909/21  
D5 STN File CA, Abstract 138:169991  
D6 STN File CA, Abstract 138:79883  
D7 STN File CA, Abstract 136:355747  
D8 STN File CA, Abstract 136:223185  
D9 STN File CA, Abstract 136:53617  
D10 STN File CA, Abstract 136:19977  
D11 STN File CA, Abstract 133:276369  
D12 STN File CA, Abstract 132:101945  
D13 STN File CA, Abstract 130:245642

D1 disclosed polymers obtained by electropolymerization which contain light-activatable units but does not describe a cross-linked pair of polymerizable monomer units, so that the polymers obtained are not electrofunctional unit cross-linked polymers where separate spaced apart strands of the polymer are linked via an electrofunctional unit.

The porphyrin monomers or polymers disclosed in D5, D6, D7 and D8 - D11 do not include cross-linked pair of polymerizable monomer units connected to an electrofunctional unit via linkers providing direct or indirect electronic communication between the polymerizable monomer units and the electrofunctional units.

D12 and D13 disclosed polymerizable monomer units which are nickel metallated meso substituted. Such structures are not within the cope of the polymerizable units of the present invention.

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## Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

Continuation of: **Box V**

**D2 - D4** disclosed photoreceptor devices which include a layer containing a kind of charge generating or transporting material and electrolytic polymer. The electrolytic polymer is shown to be preferably a five membered heterocyclic compound selected from pyrrole, furan or thiophene. However, these citations do not explicitly disclose the electrolytic polymer being attached to the charge generating or transporting material,

Accordingly, Claims 1-54 are novel in the light of citations **D1 - D13**.

The problem faced by the inventors of the present application is to provide improved conductive electrofunctional polymers, wherein the improvements overcame limitations possessed by previous porphyrin-containing polymers and polymerizable monomers, namely, that immobilisation or integration of the large porphyrin moiety in the polymer has significantly disrupted electronic communication within the polymer. The solution proffered involves polymerisation of selected cross-linked polymerizable monomer units in which there is spacing of the porphyrin moiety provided by linkers. None of the citations **D1 - D13** teaches or fairly suggests this solution.

Accordingly, the claimed subject matter involves inventive step in the light of citations **D1 - D13**.

Polymers of the invention have wide ranging applications including chemical and bio-sensing, solar energy and the like. Accordingly, the invention as defined in Claims 1-54 is industrially applicable.

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